For this homework assignment, you will create functions. Each function requires its own Matlab .m file. That means you will be creating multiple files. Please, when you turn in your homework assignment, turn in a single .ZIP file on Blackboard.

**Q1.** For the last homework assignment, you wrote a Matlab script that created a histogram of some data. For this question, I would like you to adapt the code you wrote for last week and create a function that will create a histogram for a set of data (if your code did not work, you should correct it based on the solution I will post online - or come and see me).

Your function should replicate **two** of the calling conventions for the built-in Matlab histogram() command:

\[
\text{histogram}(\text{data}, x);
\]

*data* is a one-dimensional array of data values

\[
x \text{ is a one-dimensional array of the center points of each histogram bin}
\]

\[
\text{histogram}(\text{data}, N);
\]

*data* is a one-dimensional array of data values

\[
N \text{ is the number of equal-sized bins}
\]

Create your own myhistogram() function that replicates the functionality of the built-in histogram() function. You can simply assume that if the 2nd parameter is an array that you are using the first calling convention and if the 2nd parameter is an integer that you are using the second calling convention.

Make sure your code is robust enough to deal gracefully with various combinations of data and x or N that might be passed to your function. Your code should include a test of the function (creating some data and x values and N values and creating the histogram).

**Q2.** For the first homework assignment you wrote code that calculated the value of a psychometric function \(\psi(x)\) at some level of \(x\).

\[
\psi(x) = \gamma + (1 - \gamma - \lambda)F(x)
\]

\[
F(x) = 1 - \exp\left(-\left(\frac{x}{\alpha}\right)^\beta\right)
\]

Assume that \(\psi(x)\) is a measure of probability (or proportion) in the range \([0,1]\). \(\gamma\) is chance performance (e.g., \(\gamma = .5\)), \(\lambda\) reflects lapses even under the easiest condition (e.g., \(\lambda = .05\)), and \(\alpha\) and \(\beta\) reflect the shape of the psychometric function (e.g., \(\alpha = 1\) and \(\beta = 2\)).
The general function is generic in the sense that $F(x)$ can be a Weibull function, as specified above, or it the following Logistic function:

$$
F(x) = \frac{1}{1 + \exp\left(-\frac{x - \alpha}{\beta}\right)}
$$

(In fact, there are many possible functional forms of $F(x)$, and different applications use different functions.)

Write a function that returns the value of $\psi(x)$ for a specified value of $x$. Your function should pass as parameters the constants that define the psychometric function. It should also expect a parameter that is the function $F(x)$ that defines the psychometric function (the function for $F(x)$ must be passed to the function that calculates the full equation for the psychometric function). Your function should work whether $x$ is a particular value or $x$ is a one-dimensional array of values.

You should create functions for both of the different forms of $F(x)$.

Illustrate that your function works by calling it with a range of $x$ values that maps out the full shape of the psychometric function $\psi(x)$ and create a plot of the psychometric function using the plot command. Do this for both $F(x)$. Make sure you pick a range of $x$ values that fully sweep out the psychometric function given the parameters that define it.

Use $\gamma=.5$, $\lambda=.05$, $\alpha=1$, and $\beta=2$.

Unexcused late assignments will be penalized 10% for every 24 hours late, starting from the time class ends, for a maximum of two days, after which they will earn a 0.